Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	MM Docket No. 01-145
Request for Declaratory Ruling	)	
Removing the Minimum Sub-carrier	)	DA 01-1582
Requirement for OFDM Modulation	)	
In MDS & ITFS	)	

COMMENTS OF Wi-LAN, INC.

Wi-LAN supports Cisco's Request for Declaratory Ruling in the above captioned proceeding[1]. Wi-LAN agrees that a minimum of 256, QAM (Quadrature Amplitude Modulation) modulated carriers should not be required, as stipulated by the Commission in the Declaratory Ruling and Order of March 19, 1999[2], in order to use Orthogonal Frequency Division Modulation (OFDM) in the Multipoint Distribution Service (MDS) and Instructional Television Fixed Service (ITFS).

Wi-LAN's patented W-OFDM[3] (Wideband-Orthogonal Frequency Division Multiplexing) is a spectrally efficient modulation or transmission method that provides high-speed data capability, which is ideal for carriers and Internet Service Providers who need to implement broadband wireless access systems.

[1] *Cisco Request for Declaratory Ruling Removing the Commission's Minimum Sub-carrier Requirement for OFDM Modulation In MDS & ITFS* (March 13, 2001)
[2] *Declaratory Ruling and Order*, DA 99-554 (MMB release March 19, 1999)
[3] *Method and Apparatus for Multiple Access between Transceivers in Wireless Communications using OFDM Spread Spectrum* (U.S. patent # 5,282,222)

Wi-LAN agrees with Cisco, that the original laboratory tests and results conducted by Hardin & Associates, Inc.[4] and subsequently used as a determining factor in the Commission's decision to permit OFDM in the MDS/ITFS bands, unfortunately and needlessly limits the use of the number of carriers (sub-carriers) to a minimum of 256, QAM modulated. Because of the sample of OFDM systems tested (only 4096 and 256 carriers) and the results presented, it has been misconstrued that 256, QAM carriers represents the minimum number of carriers that will just meet the Co-channel interference requirements. These results paint an inaccurate view, which needs to be addressed and corrected, so as not to prejudice the use of smaller sub-carrier numbers than the minimum 256 tested and the incorporation of other digital data modulations than just QAM on each sub-carrier.

There is no technical reason why fewer than 256 OFDM carriers or that digital data modulation techniques other than QAM will cause interference to other MDS/ITFS operations and systems. Compliance with the Commission's technical requirements for authorized equipments and systems having a Co-channel Desired/Undesired (D/U) signal interference ratio of 45dB[5] and an Adjacent channel D/U signal interference ratio of 0dB[6] is not a function of the number of sub-carriers utilized. Further, smaller number sub-carrier arrangements can be incorporated and still meet the Commission's spectral mask and out-of-band emissions requirements for the MDS/ITFS channels[7]. Again, the type of digital data modulation scheme used, i.e.: BPSK (Binary Phase Shift Keying), QPSK

[4] *Engineering Statement in Support of a Petition for Declaratory Ruling on the Use of OFDM Modulation in MDS and ITFS Services*, Hardin & Associates, Inc. (July 22, 1998)
[5] 47 C.F.R. § 21.902
[6] 47 C.F.R. § 21.902

(Quadrature Phase Shift Keying) or QAM is not a determination in itself of interference potential with other MDS/ITFS operations when compliance is achieved with the Co-Channel and Adjacent Channel interference specifications and compliance is met with the channel spectral mask and emissions criteria.

The Commission has wisely and progressively opened the MDS/ITFS operations to utilize different digital data modulation schemes like OFDM[8] and to allow full digital two-way communications systems[9], as these emerging digital technologies would better serve the public interests.

Having the flexibility of having fewer carriers translates into immediate benefits for the public because it enables more cost effective equipment offerings. For OFDM networks, fewer sub-carriers and potential wider sub-carrier spacing lessen the effects of phase noise and frequency offset, thus minimizing design requirements and complexity and therefore cost.

Wi-LAN also concurs that smaller sub-carrier carrier arrangements that create smaller bandwidth options, support the most flexible and cost effective bandwidth implementations that are permitted within the 6MHz MDS/IFTS channels. This would

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[7] 47 C.F.R. § 21.908

[8] *Request for Declaratory Ruling on the Use of OFDM Modulation by MDS and ITFS*, Declaratory Ruling & Order, 14 FCC Rcd 4121 (1999); *see also* 47 C.F.R. § 21.905

[9] *Amendment of Parts 21 and 74 to Enable MDS and ITFS Licensees to Engage in Fixed Two-Way Transmissions*, 13 FCC Rcd 19112 (1998), *recon*., 14 FCC Rcd 12764 (1999), *further recon.*, 15 FCC Rcd 14566 (2000); *see also* 47 C.F.R. § 21.905

facilitate the most optimal network engineering when considering data throughput speed requirements and expectations balanced against user rates and abilities for the service.

However, it is important to note that excessively reducing the number of sub-carriers creates other detrimental issues, most significantly the impact on data throughput. This is because the number of data transport carriers is being minimized and overhead like the OFDM cyclic extension becomes more profound. Trying to compensate with higher orders of QAM modulation negatively impacts the system network range because of diminished receiver sensitivity.

Accordingly, Wi-LAN requests that the Commission grant Cisco's petition for declaratory ruling and amend its rules by removing this arbitrary and unnecessary restriction on the use of OFDM in the MDS/ITFS bands, eliminating the minimum 256, QAM modulated carriers and allowing any number of OFDM carriers and allowing different digital data modulations used on the carriers. Removing this restriction on OFDM digital technologies will not cause interference to other MDS/ITFS operations. Such a decision by the Commission will have a positive and beneficial impact by creating the most flexible service offerings available and improve time-to-market availability and attraction of such services to public users of broadband wireless access.

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